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PERSPECTIVE.

A

PRACTICAL TREATISE

ON

PERSPECTIVE,

ADAPTED

FOR THE STUDY OF THOSE WHO DRAW

From Nature,

BY WHICH

THE USUAL ERROURS MAY BE CORRECTED.

BY J. VARLEY.

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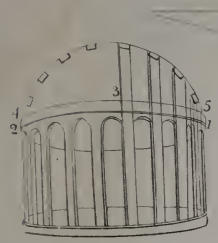
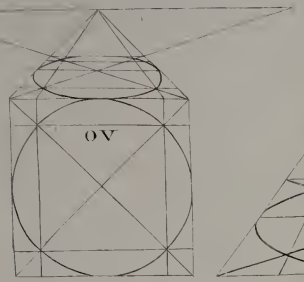
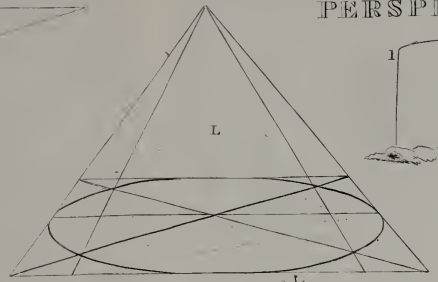
PERSPECTIVE







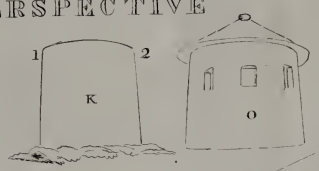
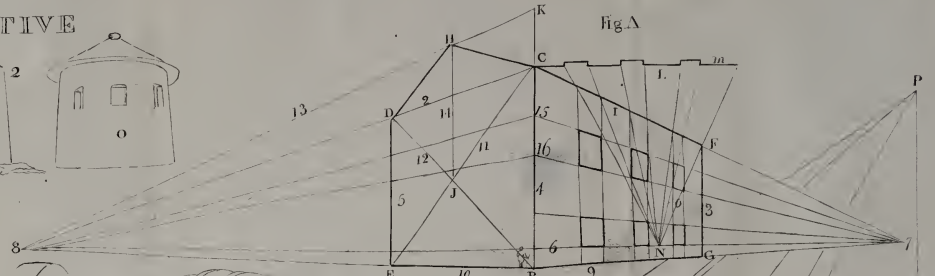
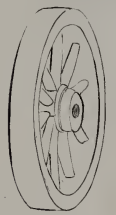
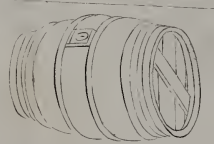


Fig A







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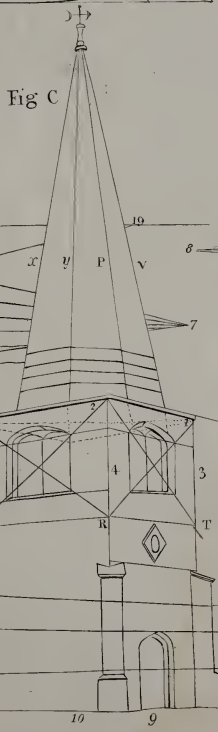
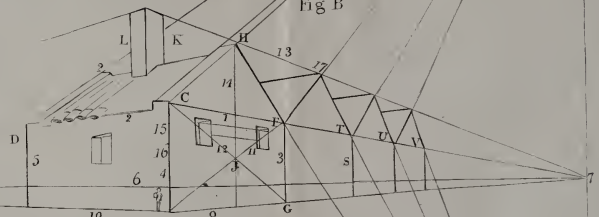


Fig B



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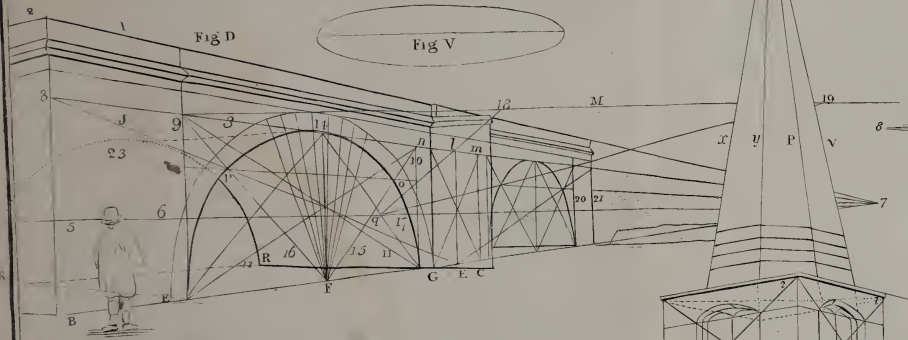


Fig V

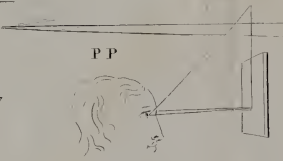


Fig T

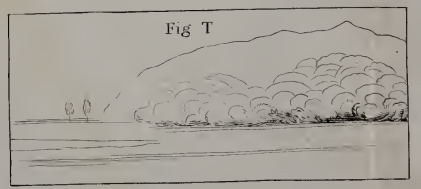
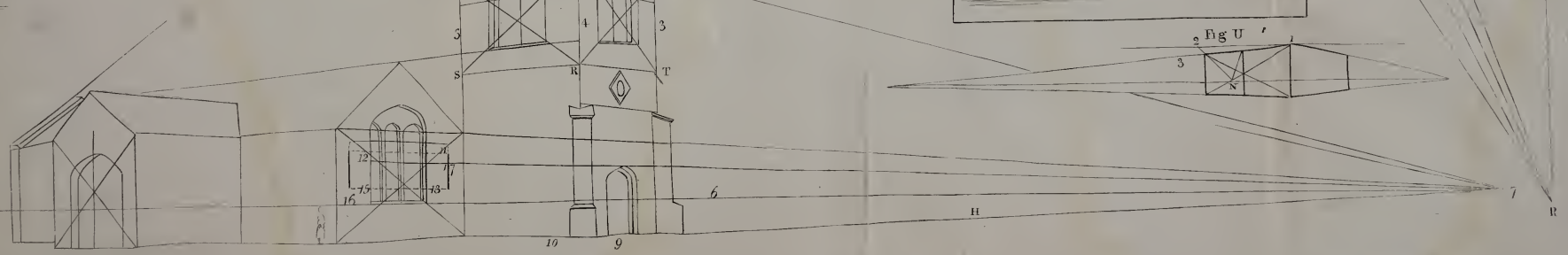


Fig U



PREFACE.

THE numerous applications which are made, for an easy Introduction to Perspective, suited to the capacity of young beginners in the art of drawing, have induced the Author to publish the present treatise, which contains such examples and instructions, as, by several years experience, he has found most useful and intelligible to his pupils. In its execution, the simplest methods are chosen ; and as it is offered, not as a scientifick, but as a practical work, it may be the more acceptable ; the objects inserted being among those most frequently attempted, and placed in those points of view in which they are generally seen in nature. As the various parts of the science help to explain each other, the whole may be considered as one example included in a single sheet. Its object is not to teach the pupil to draw from plans or measurements, which is the practice of architectural and mechanical draughtsmen ; for the use of whom most works on perspective, hitherto published, have been written ; but for those, principally, who draw by their eye from nature, and others, who, departing from the geometrical proportion of the objects before them, from choice,or errour in judgment, feel the necessity of ma-

king one part of the object consistent with the other in its perspective delineation.

In works of this nature, the *matter* must fully occupy the attention of those who desire to profit by them; therefore, the frequent repetition of terms, and the digressions necessary to render them more intelligible, are not so likely to offend as in works of taste or fancy.

PRACTICAL PERSPECTIVE.

PERSPECTIVE is the art of drawing outlines of objects in nature, as they would appear to the spectator on a plane of glass, set upright between himself, and the objects, and viewed by him from a point exactly in the centre, where the rays of vision meet, between the two sides.

The following definitions of the principal features in the science and application of Perspective will prove useful to the student.

DEFINITIONS.

HORIZONTAL LINES.

THE Horizontal Line is the proportion of height between the top and bottom of the plane, or picture, at which the spectator views the same. It would, in most cases, look formal if placed across the middle of the picture, so as to divide it in half; therefore, Claude Lorraine has generally made it about one-third the height of the picture from the ground line, or bottom

of the plane or picture, and which is the most natural appearance for open landscape, where the sky and trees are pre-eminent in the space they occupy.

POINT OF SIGHT.

Gasper Poussin frequently placed his horizon about one-third from the top of the picture, which inclined it to a bird's-eye view, where the land appears much larger in space than the sky. On the centre of this line, all the lines of objects which go *direct* from the spectator, vanish; which place is called the point of sight, and those lines which go *obliquely* from him, vanish on other points of the same line. This line is the height of the spectator's eye; therefore, above it, no pool of water, nor any surface which is level, can be seen; and, on it, all objects, however large, vanish in a point.

NATURAL HORIZON.

The natural horizon, formed where the sea and sky meet, owing to the convexity of the earth, is a little below the perspective horizon, which is in distance infinite; but, in the horizon of the sea, the distance is, to a person standing on shore, about five miles; and, therefore, the tops of vessels can be seen beyond it: and, on a mountain, 3,000 feet in height, this horizon is about 60 miles in distance; and far beyond this, mountains may be perceived, and this horizon rises, of course, to the height of the mountains on which the spectator stands.

VANISHING POINT.

Therefore, to point to an object on the floor where you stand, you must lower your hand; and, if it were at the farthest end of the room, to direct your hand to it, you must raise it: if it were at five miles distance, to point at it, the hand must be raised to the height of your eye; and, if a line of objects were as many miles in length, equally extended on the ceiling, to point from the objects over your head to those in the greatest distance, you must lower your hand to the height of your eye. In the same manner, the sides of the room, right and left, would, as they receded from the spectator, incline to the centre of the end of the room, at a point the height of his eye, provided he stood in the centre between the two sides of the room, looking directly down towards the end of it. Likewise, if a spectator, with a long string in his hand, were to look at the reflection of his own eye, in a perpendicular looking-glass opposite to him, and his friend were to hold the other end of the string against the glass, so as to intercept the spectator's view of his own eye therein; if the latter were to raise his end of the string so as to make it parallel to the upper or lower line of the right or left side of the room, where they meet with the ceiling or floor, the line of each side of the room would appear to go down into his eye in the glass; through which place, the horizontal line would be drawn, if it were a picture; on which, at the place where he views his eye in the glass, is the point of sight, which is always in the middle of the picture; because no one would hold a frame,

or glass, before him, to see a view through, without placing it so that his own head should be in the centre: and it must be observed, that if he should move, wherever his eye would appear to him in the glass, there would be the point, to which the two sides of the room would vanish.

BIRD'S-EYE VIEW.

A bird's-eye view is supposed to be taken from some elevated spot, which commands such a prospect as nearly resembles the plane of the places seen. Some idea may be formed of this by standing on any height and observing how low those objects, which are near thereto, will appear, when compared with those more distant, taking, however, the perspective diminution of the latter into consideration.

EXPLANATION OF THE PLATES.

FIGURE A represents the outline of a building, the drawing of which should be commenced on the following principles: having, first, agreeably to your taste, if designing by your eye, or a guiding rule, if sketching from nature, determined and drawn in the order in which they are numbered, the lines No. 1 and 2, which are the highest horizontal lines, and *on which*, as their inclinations to their vanishing points are greater than any of the other lines, the first perspective appearance of a building generally depends: next, proceed with

No. 3, 4, and 5, observing that, as No. 4, is the longest and nearest perpendicular line, it is more proper to determine its length, first, as at C and B, it being more convenient to mark on that the measure of the windows, &c. and by it to determine the horizontal line, which is the height of the spectator's eye from the point B. Attention must be given to the proportion of the objects marked on the line 4; for, if the whole length of this line, from B to C, were thirty feet, and the height of the spectator's eye only five feet, the horizontal line could only intersect it at one sixth of its height; and for forming a ready judgment of the height of the *horizontal line*, the draughtsman may suppose his own figure as at B, provided the ground he stands upon to view the picture be level with the bottom of the house where the figure stands, at B; but, should the spectator stand upon a hillock five feet in height, the horizontal line would then be ten feet in height, and intersect the line 4, at one third of its height; and, if he should be in a hollow, five feet below the bottom of the house, the horizontal line would then cross the bottom of the house at B, the spectator's eye being five feet in height from the ground *whereon he stands.*

Having drawn the horizontal line according to the above instructions, continue the direction of the line No. 1. till it meets with the horizontal line, which it will do at the point 7, which being the vanishing point of the whole of the surface, BCFG, will enable the draughtsman, by drawing the line No. 9, from the point B to the point 7, to determine at the point G, the per-

spective height of No. 3. This being completed, continue the line 2 till it meets the horizontal line on the other side of the building at 8, by which means the vanishing point for that side of the building is found; and, by drawing a line from that point, to the bottom corner at B, the perspective length of No. 5, is determined in the same manner as 3, on the other side. Then, in order to find the point of the gable end H, first find the perspective centre of the line No. 2, by drawing the diagonal lines 11 and 12, from the corners C and D, to B and E; then from the corner C to K, raise the proportion which the height of the gable bears to the line 4. This geometrical height being determined at K, draw the line 13, from thence to the vanishing point 8; then draw the perpendicular line 14, from the diagonal centre J; and where it intersects the line 13, at H, is the true perspective height of the roof at that place.

In sketching from nature, the diagonal and the vertical line 14, are all that are necessary; for, by the last method, should the gable be drawn higher or lower than the real or apparent height, it would not exhibit any perspective distortion, whereas the gable might be drawn exactly true in height, but, by wanting a right centre, be very offensive to a correct eye.

The draughtsman may now proceed to find the relative perspective distances and situations of the windows, &c. between the points C and F at the top of the building, by the following rules. First, draw a horizontal line L from the point C; then choose a point on

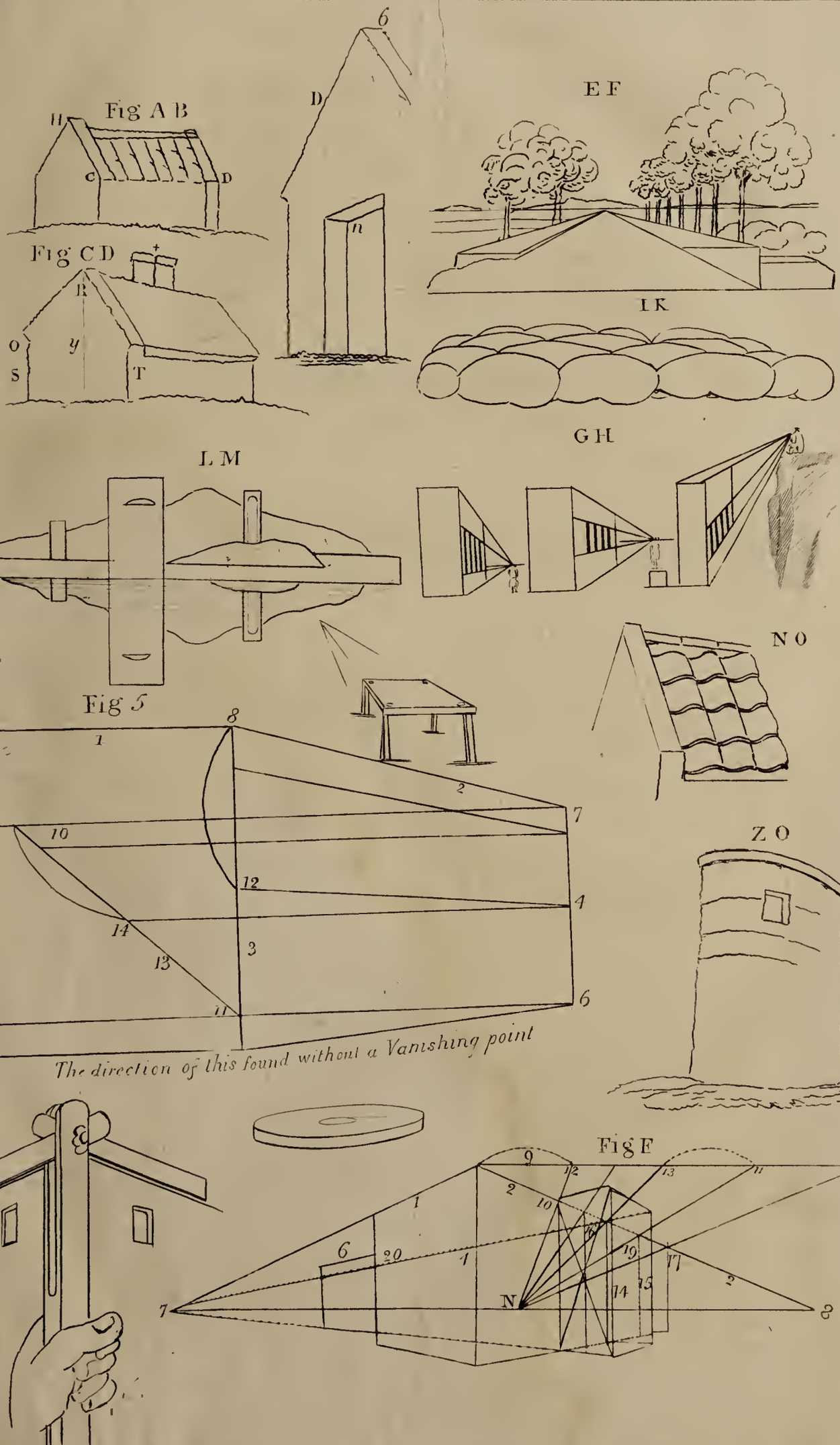


Fig A B
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Fig C D
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Fig 5
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the horizontal line, such as N, that it may give good intersections on the upper line No. 1, to such lines as may be drawn from it; then draw the line O through the point F till it intersects the line L, at M. The space on the line from M to C, must then be considered as the geometrical length of the house; and as this whole geometrical measure, M and C, exactly corresponds in length with the whole perspective space between F and C, when viewed from the point N, so will a line drawn from a division of half of the geometrical space, M, and C, to the point N, give on the perspective line No. 1, the perspective half, and so on with any other proportion, *set off on the geometrical line and drawn to* N. The corresponding parts in the perspective line, F and C, found by the above means, require the same number of perpendicular lines, drawn downwards from the intersections on the above line, and which will represent the perspective width of the windows, &c. The situation, with regard to the height and length of which, must be determined on the principal and nearest corner line, No. 4, it being the most convenient line on which the perpendicular measure of those objects may be marked, as at No. 15 and 16, from whence, two lines being drawn to the vanishing points, 7, by intersecting the above-mentioned vertical lines, give the true height of the top and bottom lines of the windows.

It is here necessary to observe, that the point N, on the horizontal line, might have been more to the right, or to the left, without making any difference in the proportion of the intersections on the line No. 1,

provided the line drawn from it is continued through the corner F; for, had it been more to the right, and in consequence, intersected the line L, at a greater length from C; yet, as the measures of the windows, &c. must then have been adjusted so as to bear the same relative proportion to the line L, as they now do in the example, the intersection on the line 1, then becoming more oblique, would have caused the intersections on the line 1, to come exactly the same as they now are.

Proceed with the building, Figure B, *(Plate 3.)* in the order with which the Figure A commenced, which may be imitated in its principle with ease, until you come to line 13, as their figures and significations so far correspond; and the only differences which may be found, consists in the diagonal being used on the *left* side of the building, instead of the *right*; on which last, the diagonal in the Figure A is placed; and, in the line No. 1, being a little higher at the point C, than the line 2 would be, if carried to that corner, owing to the difference in the designs of the buildings only; and differing in No. 13, where the height, which, in Example A, is set off from C to K, is not used; but the first slant, C H, of the gable, depends on the judgment, and by intersecting, when so drawn, the vertical line No. 14, already drawn, determines its own height. Now, it must be carefully remembered, that all lines which, like the hands of a dial, are level with the side of the building on which they are fixed and are horizontal, vanish at the same point at which the top and bottom lines of that building must vanish; and if,

when thus horizontally placed, the farthest point from the spectator is lifted up, as the hand of a clock must be when altered from 9 to 11 o'clock, while the spectator stands on the side on which the figures for 3 o'clock are placed, this line, must, if continued, vanish upwards so as to find a point in a line, exactly vertical to the vanishing point of the side of the building on which it is placed, and which vertical line should be previously drawn, as at P, which is on a line vertical to the vanishing point No. 7, on the horizontal line; but should the hand of a clock be moved downwards from nine o'clock to seven, it would then vanish exactly at the same distance below the point No. 7, as the former vanished above it, at the point P; consequently, the line H R must express as truly the line H F, as the line C P determines the centre part, H C; but, as the point F had been previously determined by the line C, drawn to the vanishing point No. 7, the use of the point R is superfluous, for the nearest building; but, if you had to represent a long series of houses, with gables of the same geometrical height and width, continued in the same line, its use would then be manifest, as, by first drawing the line H 7, to regulate the height, you have only to rule from the farthest corner F, which has been determined up to the point P; then, from where it intersects the line H 7, as at No. 17, draw another line down to the point R, and where it intersects the line, No. 1, 7, it gives another corner, as at T, to proceed with for the other buildings, as U, V, &c. But the principal use of this rule, and its general importance, consist in its determining how much more the roof on the

right hand inclines to the left, at D 2, than at C H, by going to the point P, as the neglect of this rule, is not only visible in works of beginners, but in publications for instruction, wherein the lines 2 and D, are made discordant with H C, as in the little erroneous outline A B, *(Plate* 1.*)* which two lines, instead of meeting upwards, as in the point P, in the example B, *(Plate* 3.*)* would, if continued, meet below the building.

The side of the chimney, bounded by the line K, vanishes to 7; that bounded by L, vanishes at the point 8, as K is parallel to the side of the building of which No. 1, is the upper line under the gable, and L is parallel to the right-hand side of the building. The deviating from this rule, is apparent in the figure C D, *(Plate* 1.*)*; when the line of the chimney marked with a + goes upwards instead of downwards, to a vanishing point, such as No. 7, in the Example B. *(Plate* 3.*)*

The great use of the diagonal lines, in finding the true perspective centres of gables, &c. is manifest by observing the continual errours of those unacquainted with them; C D. *(Plate* 1.*)* is an example accompanied with the usual errour, wherein you may perceive the perpendicular line from the point of the gable R, which, instead of falling through the point at Y, nearer to the line S than to T, is, in this outline, the reverse; and this errour is more remarkable, as we may suppose, that the only fault, resulting from ignorance, would be to place the point of the building as in reality it is in nature; that is, in the geometrical, instead of the perspec-

tive centre, and not, as is frequently the case, to double the errour, by making the nearest half of a surface less than the farthest; but this errour is so prevalent, that it is often perceived, even in the cottages of Teniers, but the fault is in a measure concealed by his other excellencies.

The next fault, proceeding from the neglect of the principles in the Example B, may be perceived in the margin, in the building C D, where the point O rises, instead of falling lower than the corresponding point, at the top of the line T; whereas it should have inclined downwards, on the principle of F C, in the Example B. (*Plate* 3.) The farther use of the diagonal lines may be seen in the windows of the front of the house B, and particularly in the windows of the tower-end of the body of the church, where, having first drawn the nearest line of the windows No. 15, from the part where it intersects the diagonal, near to No. 12, you must draw a line to the vanishing point No. 7, and through the place where it intersects the other diagonal line No. 11, draw the farthest window line, to No. 13, by which means both the window lines No. 13 and 15, will be at the same perspective distance from the centre.

If a line, as No. 16, near the church window, does not intersect any part of the diagonal, continue the line upwards or downwards, till it meets with the diagonal; from thence draw a line to the vanishing point No. 7, which will intersect the line No. 11; then, from the intersection, draw a perpendicular line, upwards or down-

wards, as may be required; and it will give the true perspective place for the counterpart of No. 16, in the other side of the window, and equidistant from the centre; but the top and bottom of the line must be determined by drawing two lines from the upper and lower parts of the line 16; and between both ends of the dotted line, at 17, is the true perspective length, at that place. In the front of the building B, (*Plate* 3.) the width of the first window being determined according to taste; lines drawn to No. 7, from the two places where it intersects the diagonal, No. 12, give the corresponding intersections.

For finding the situation of the tops of spires, the flag-staffs, &c. which are in the centres of the towers on which they are placed, the method used by many artists is to draw the perpendicular line for them exactly between the two outside lines of the tower on which they stand, as at figure O, (*Plate* 3.) It is in the general views given of towers so near the truth, that it is used for expedition; but the following is the method for those who wish to do it according to the rules.

To find the true perspective situation of the weathercock, which must be over the perspective centre of the tower, the learner should first draw a line from the farther and upper corner of the right-hand side of the church, down to the vanishing point 7; then, from the farther and upper corner of the left-hand side of the buildings, draw another line to the vanishing point 8, out of the picture; by this method, these two lines,

which could not be seen in nature, as they are at the back of the church tower, will, where they intersect each other, give the corner which is at the back of the building, and from which a line should be drawn to the nearest and highest corner of the tower of the church, for a diagonal; and it must be remarked, that as these two corners, although opposite, appear very near each other, this line will be very short; then, from the farthest corner, on the left hand, draw another diagonal line to the farthest corner on the right hand, and from where these two intersect each other, draw a perpendicular line to the height required for the weathercock, which will be in its true situation, when placed upon this line. But, at R, in the figure M, (*Plate* 2.) this method is practised from the lower lines of the building; but, as the intersections are more oblique at the bottom of a building, the above method is preferable, as a small errour will throw the centre out of its right place; but, in the figure R, (*Plate* 1.) the top line S, being horizontal, which makes it what is called Parallel Perspective, the centre T, found by this rule, is not exactly between the outsides O and V. This method, although agreeable to the rules of perspective, yet giving the appearance of distortion, should be generally avoided.

Figure C, (*Plate* 3.) in the Example of the church spire, which has eight sides, in order to place them equally on each side of the church tower, you must suppose the latter had been built no higher than the line O; determine, according to judgment, the bottom of the line of the spire P, with re-

gard to its distance from the line No. 4, then the line P, if continued, would have come to the front of the building at O; then, from the corner, formed by the line 1 and 2, draw a diagonal line through the point, where the line P stops at O, till it touches the line 3, through which place, at T, from the vanishing point 7, draw a line to R, which determines the true point to which the other diagonal line, from the upper corner at No. 1, should be drawn; then, from the point R, draw another line from the right-hand side of the church to the vanishing point 8, which point would reach, on the horizontal line No. 6, about thirteen inches and a quarter from the line 5, which is equal to the space from the top of the round tower O, to the bottom corner line which bounds the plate on the right; and consequently, would require the addition of a slip of paper fixed to the right hand side of the picture, beyond which it reaches, except it is begun on a larger sheet of paper, which will do without joining. This measure can only be used for a copy of the same size. The line so drawn, from R to the point out of the picture, would intersect the line 5, at S, and, from the points R and S, the other two diagonal lines must be drawn; and R S, by vanishing in the same horizontal line as R T, though in a different direction, makes the point S correspond with T in height, as S and T are in reality equidistant from R, though the perspective appearance makes them vary, and their geometrical height from the ground are exactly the same. These points being determined, and the diagonal drawn, next draw a short line from O towards the point 7, and the

intersection made by it, on the opposite diagonal, will be the true place to rule the line *v* of the spire to; then, from where the line, passing through O, comes to the corner line 4, continue a similar line to the point out of the picture, and where they intersect the diagonal, on the right-hand side of the church, are the points, which exactly correspond in situation to those on the left-hand side, and to where you must rule the two remaining lines of the spire *y* and *x*, faintly, after they pass below the top line of the tower; for, where the drawing is finished, this latter portion of lines must not be seen. But in this Example, they are dotted, that the method of finding may be remembered.

Fig. D represents a bridge. Here, as usual, the top line of the bridge, No. 1, is first begun and carried to C, from whence the line 2, which goes out of the picture, commences. The figure, as before, determines the height of the horizontal line at 6, the bottom line of the bridge, at B, having been previously determined; and, it must be remarked, that if the ground is level, it matters not whether the Figure stands near to or far from the bridge, as the head will always be on the horizontal line, though the place of the feet may vary. But, for readiness of judging the relative height, the Figure placed close to the house, in Example A, is best; then having drawn the horizontal line 6, from the corner 5, continue the top line No. 1, down till it meets with the horizontal line at point 7, which is near the spire

of the church in the Example; then, from B, draw the bottom line at the water's edge to the same point 7; then, agreeably to your judgment, draw the space which the span of the arch occupies, by making the two perpendicular lines 9 and 10; then draw a line from the corner 8, to the vanishing point 7, for the height of the inside line of the top of the arches; then, from the corner formed by the lines 8, 9, 10, and the bottom line from B to the vanishing point 7, draw the diagonal lines 11 and 12, and, in the centre, where they intersect each other, draw the perpendicular line upwards, till it intersects the line 8, and determines the key-stone of the arch, at 14, and downward, till it reaches the line which determines the lower part of the bridge, at the point F; which point is not only useful to find the true directions of the sides of the key-stones, but of all those round the line of the arch, and is of much importance, as many arches are spoiled by only one or two divisions of these stones being drawn to different points; and from this point F, two lines may be drawn to the corners above, where the two diagonal lines have just been drawn; then draw the line *q*, from the point at the key-stone, down to the point G, at the water's edge, and another line from 14 down to the point E. This will serve, in part, as a guide to draw each side of the arch by; then draw, by your eye, the farther side of the arch 17 from the point 14, down to G, and through where the arch intersects at *o* the line 15, drawn from F. You must draw a long line from the vanishing point 7;

and where it intersects, at P, the line 16, which is the counterpart of 15, there is the point through which the corresponding nearer part of the arch, from 14, must be drawn in its progress to the point E. The Example G will more fully explain these rules; and the principal object is to make one line of an arch consistent with the other, though both may vary a little from the object in nature, and which, to beginners, is one of the most difficult things to accomplish without Perspective; and here the principle of the rim of the cart-wheel will be useful in drawing the rim of stones round the arch, where, as in the wheel, the upper part of the rim retains its relative height or width; and though the viewing the arch or wheel in front would make the rim appear equal all round; yet the side view would only operate in the sides to make them narrower; but, in the cart-wheel, and in the barrel, this difference from the arch must be observed, that, as the surface of the rims inclines inwards with a stampher, the nearest rim in the wheel at *x*, which, in a flat surface like the bridge, would be the largest, as being nearest, is here the narrowest, and the view might be so oblique as to hide it entirely, and yet leave the other side to view. This is often seen in the side view of Gothic arches. This rule is of the utmost importance, and should be felt as well as understood, as several persons who have professed the science when drawing by their eye, have so far failed, that they have, in a side view of a wheel, made the width of the rim equal all round.

The next thing to be drawn is the buttress, which is of a triangular form; the size of which draw according to your judgment. The space of the buttress, where you intend it should join the bridge, describe by *n*, for the part nearest to you, and the other side, which could only be seen by the buttress being transparent, describe by M, on the line 8: then draw from thence two perpendicular lines down to the bottom line. When the farthest line, M, falls to a point a little higher than where the buttress touches the water; then draw the two diagonal lines from *m* and *n*, to the bottom corners of the buttresses, and having, by this method found the centre, draw through it the perpendicular line to *l*, which now determines exactly half the space of the length of the bridge, and two arches from the point 9, to the point 20; now, to find this last point, which hitherto has not been determined, draw a horizontal line M, from the point 9; then from the point *q*, or near it, as on the horizontal line 6, draw a line through the point *l*, in the buttress, to the horizontal line above, where it determines the point 18, as the geometrical half of the length proposed, from 9 to 20; then, on the line M, from 18, set off the same distance, as the point 18 is from 9; and, to that point, rule another line from the same point *q*, in the horizontal line 6, and where it cuts the line 8 at 20, it gives, from *m*, the true Perspective length of the span of another arch of the same size, which must be drawn on the same principle as the first arch; and, for the corresponding length of the space,

from 9 to 8, which is expressed by the space from 20 to 21, draw the line J from the centre C E of the bottom of the buttress, through the nearer arch to the point 8, which here happens to cut at P, the line, which, in its way to the vanishing point 7, cuts the distant arch near 20, and it will give that place for a point, through which a line corresponding with J, and drawn from C E, must pass, which will cut the line 8, and give the distance for 21 ; and, as the narrow space, between 20 and 21, represents the same space as is between 8 and 9, it shows the perspective diminution at that distance. As the buttress is triangular and comes to a sharp edge, at the part which projects farthest from the bridge, the top of it, just under 18, is made horizontal, but had it been at right angles with the bridge, the top line would then have vanished to the point, on the horizontal line out of the picture on the right hand, and that part of the line which is farthest from the bridge, would, of course, be the highest. It must be remembered that the line 9, is only placed for a side line, for the convenience of drawing the diagonals, and is not meant to describe the nearer part of the bridge as projecting.

If you continue the horizontal line 6, about seven inches and a half out of the picture, on the right hand side, at that place is the vanishing point for the line next the water, under the bridge from G to R, and for the direction of the horizontal division of the stones under the arch, and for all lines which

are at right angles, with the side of the bridge, already drawn. Having determined the width, at R, agreeable to judgment, and drawn it to the point above mentioned out of the picture, draw another line from E to K which could only have been seen if the bridge was transparent; then, from the point at 14, on the line 8, draw the dotted line to the point out of the picture; then, from the vanishing point 7, through the point R, and where it meets with the point K, at the edge of the picture, is the point to where the line of the arch would appear to rest which springs from the point R; and, in the Example, that part of the line which is seen is marked stronger, and the rest is only drawn to serve as a guide, for the true directions, which would be difficult to guess at, without the whole arch was supposed to be seen.

Figure D, to represent the width of pilasters, arches, &c. round a circular tower. The following method may be used, as the simplest. Having drawn the outside lines of the tower, 1 and 2, next make the point 4 and 5, of equal height from the level ground at its base; then draw a semicircle from those points, as in the Example, and, on the circumference, place the same number of measures of objects as are required in their true geometrical proportions to the semicircle, and from thence draw perpendicular lines downwards, and where they intersect the line 3, it will give the apparent situation, increase, and decrease of the width of windows and other objects round the tower.

It must be observed, that, in order to prevent objects from being distorted, when drawn truly in perspective, it is required by those who are tenacious of the rules of the science, that the spectator should stand at a distance sufficient to enable him to see all the objects on either side of the picture from one point, without inconvenience or turning the head to view them; but, for the sake of describing a greater extent of country and objects, few artists, or amateurs of taste, scruple to represent on a flat picture a view inclining to panoramick; and as, in this case, the strict adherence to the rules of perspective would lead to distortion in the tops of circular towers, and objects placed at the extremities of the picture, they are often partially dispensed with in objects so placed. In this case, the two outside lines of a round tower, would, by an artist, be made of equal height, the same as if the tower was seen in the centre of the picture, where the sides are admitted to be of equal altitude as K and O, in the Example of the towers, at the top of the plate, as this last is the true impression received from the objects, whether on the right or left side of a view, to which the spectator will always turn his head; but, in perspective, as the spectator is supposed to view the objects as through a small hole from one point, without turning, and to draw them as from that place, they would appear on a plane of glass interposed between the spectator and the object, the tower at Z O, on the left side, at the bottom of the picture, by this method, would appear distorted, as in the Example,

and higher at that end which is farthest from the centre of the picture; but, as the best pictures are often viewed by several persons at the same time, the pleasure they afford arises, in part, from the forms of the objects being agreeable to the impression generally received, without regard to the practice of viewing them from one point, as a mechanical draughtsman may do; therefore, any thing which might appear contrary to general impression, even to an inexperienced eye, is to be avoided, as nothing is gained to the mind in a picture in which the departure from the general idea is such as to require explanation or defence, it is therefore necessary to avoid what would appear as the abuse of perspective, in those works which are drawn with freedom, and where one part of the picture has no objects to support the distortion in another; for it must be remarked, that, as objects at a distance are always seen nearly in their true shape, if a hundred columns were drawn in a right line from the spectator, and of course vanish to the point of sight, the perspective variation or distortions of the curves, at their tops, would be so gradually led on from the distant to the nearer ones, that the whole would look consistent: but if, in drawing two columns of equal size, and equally distant from the ground line of the picture, you were to make the one, which was in the centre of the picture, smaller in width than the one which, being near the edge of the pictnre, is more distant from the spectator, this though true according to the rules of the art, in a picture

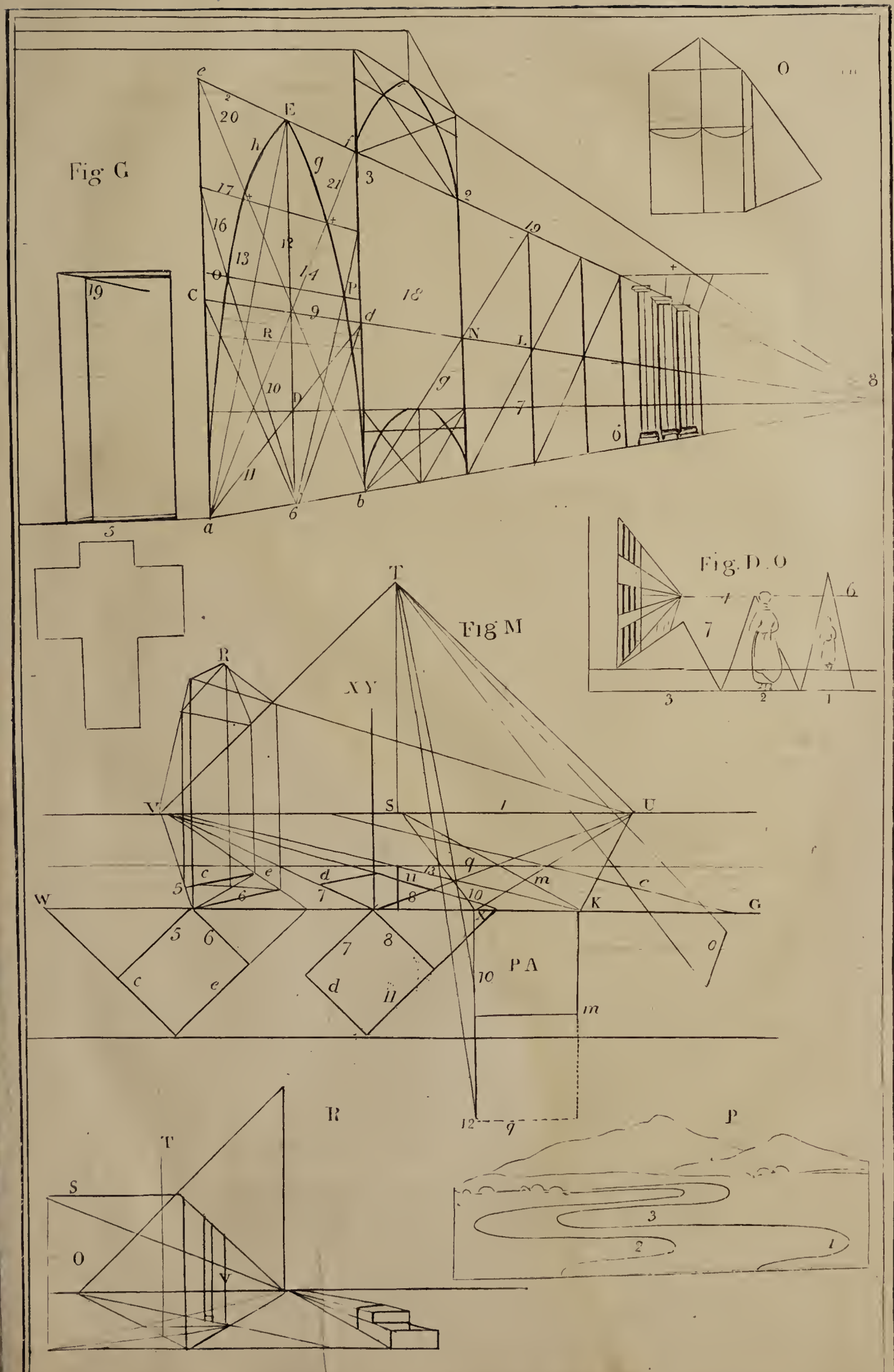
Fig G
O
E
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where the spectator is supposed to be very near to the centre of a row of objects delineated, would appear to reverse the general practice of the science, and would give the observer a false impression of the size of the objects; therefore, most artists, when treating of a long front view of a temple, or other building, make all the columns of the same width as they would appear in a geometrical elevation, which last, when well shadowed, is often very satisfactory, considering the simplicity of the means; and it may here be remarked, that Nicolo Poussin, and others, who have practised the higher walks of landscape, blended with architecture, have chosen to represent many of their buildings at a moderate distance, in such a point of view, that they differ little from elevations, their top lines being generally horizontal; and in them the principles of perspective are principally obvious in the different magnitudes of separate buildings, owing to their various distances, rather than in each building being conspicuous in its own perspective variation from its real form.

The tower K, at the top of the picture, although true with respect to the equality of height, in the points 1 and 2, is nevertheless given as an example of errour in the sharpness of the top corners, at 1 and 2, instead of which, the curve at the top should melt into the outside lines as in the tower at O; and, as a small variation of line will produce the errour, it is more necessary to guard the pupil against it. This fault may be perceived in the towers of many emi-

nent painters of the old school, in several modern productions, and often in engravings made from paintings, which have been free from the mistake.

Figure G exhibits, on a larger scale, the method of drawing arches, so as to make one side agree with the other; the first curve being drawn by the eye. Begin with the top line, 1 and 2, for the height, and with 3 and 4, next, for the width of the arch; then, 5 and 6 for the bottom lines, 7 for the horizontal line, and 8 for the vanishing point. No. 9 is a line drawn to give corners for diagonals, and to show that any divisions, as from 9 to 6, large or small, ruled to the vanishing point, between the two perpendicular lines, 3 and 4, will serve to find the perspective centre of the space between those two lines, by diagonals drawn from the respective corners; as, *a*, *b*, *c*, *d*, formed by those four lines, 3, 4, 6, and 9, &c. and will give, where they intersect an equally true centre, as can be obtained from the longer diagonal, 20 and 21; then draw the lines 10 and 11, and through their centre D, draw the perpendicular line 12, up to the point E; from which point rule the lines 13 and 14; then, as near as you can imitate by your eye, draw the curve *g*, of the arch; likewise, draw the lines 20 and 21; and through where 21 intersects the curve *g*, at +, draw the line 17, to the vanishing point 8, and where it intersects the line 20, it will give the point through which the curve of the arch *h*, must be drawn; then, from the bottom of the line 12, draw the lines 15 and 16, up

to the corners formed by the lines 17, 3, and 4; and through where the line 15 intersects the curve *g*, at the point P, draw a line from the vanishing point; and where it intersects the line 16, near O, is the point through which the curve *h* must be continued from the last point +; then, observe where the diagonal line 11, below, intersects the curve near the corner *d*; and, through that point, draw the line R, from the vanishing point 8; and where it intersects the diagonal 10, near *c*, which is the counterpart line of 11, is the point through which the lower part of the arch is to be drawn down to the corner *a*; and if the learner would wish to be more particular, the greater number of intersections he chooses to make, so many more points he may get to guide him; but, in general, those two above described, are sufficient.

The next thing to be noticed is, that the line 19, at the upper part of the side of the door on the left hand, which represents the thickness of the wall, goes to the vanishing point 8; and, it must be remembered, that this line, and the one which is at the bottom, never vanishes to the same point as that to which the side of the house goes to on which the doors are made, but always to the point where the horizontal lines of the other side of the building vanish; both sides of which we must suppose to be at right angles to each other, which is generally the case.

Figure M exhibits the method of drawing from plans; but as this method is not recommended in this work, which rests on the eye and judgment for the commencement of the general proportions of objects; those who are desirous of acquiring a thorough knowledge of it, are recommended to the perusal of several eminent authors, whose aim is to give instructions in the science. A few remarks and examples only are here given to enable those who wish to proceed farther in the science, to attain some idea of the foundation, and definition of its general principles.

Having drawn the lines which bound your picture, draw the horizontal line, No. 1; in the centre of which, is the point of sight S, at which point all level lines which proceed direct from the spectator, (or in the same direction, if distant from him on either side,) and which are called right lines, vanish. The point T, is the point of distance, or transposed place of the eye, and is raised on the vertical line perpendicular to the point of sight S from which points, the two points, V and U, are at equal distance; this distance is the proportion of space from the spectator's eye to the picture; and if the plate of glass through which he views the picture, be three feet long, and he views the landscape at three feet from the glass, the point of distance must then be of the same length as the picture; as these distances, U and V, make each an angle of forty-five degrees from the spectator's eye, they serve as vanishing points for all lines at that angle, right and left, from the eye; and the point T, for all

lines to vanish to, which are elevated from right lines to that angle; and, as an angle of forty-five degrees is the diagonal of a square, if you carry any line to the point of sight from the ground line (as from K to S) or any other horizontal line which may be farther in the picture, and then intersect the line *k s*, by a line drawn from the point V, (but more conveniently from the point U,) to the ground line W G, as at X it will give a perspective space (from its intersection *m* to K,) which represents the real length from X to K, and form a diagonal line on a perspective square, which line will incline forty-five perspective degrees from the ground line; as the sides of all squares, or oblongs, which vanish in the point of sight, are represented in the plans as perpendicular lines. The length of any line, in its perspective representation, may be determined by drawing a line from the point T, to the extent of the space required to be found; as, for instance, the space from X, on the ground line, to No. 12 at the bottom of the plan; and where, at 13, the line from T intersects the line in the representation, which is drawn from X to the points of sight, is from that intersection to the point X the representation of the exact quantity of space in perspective, as from X to 12, in the plan; and if a horizontal line is drawn through the point 13, from one side of the picture to the other, it will give, at its intersection, on any lines which are drawn through it, from any part of the ground line W G, to the point of sight, the same length in perspective, one with another, though, by some of the lines being drawn from the ground line, near the edge

of the picture, as from G, they will, in representation, appear much longer than the one from X to 13, which is much nearer to the spectator; and, by these means, it may be perceived, that as the little apparently perpendicular line, under the point of sight, reaches to the horizontal line which intersects the point 13, it must, of course, be as long in reality as the long perpendicular one X V, near it, and of course the same length as from X to 12; but, lying flat under the point of sight to which it vanishes, it cannot incline one way or the other, but its lying down, would have been apparent, had it been a walking stick, by its farther end decreasing, owing to its sides vanishing to the point of sight.

Lay a rolling or parallel ruler to the line 8, belonging to the side *a*, square in the plan, and roll it up to the point T; a line then drawn by it down to the horizontal line, will give the point U, for the vanishing point of the line 8, and all lines parallel to it, at any distance whatever, right or left, of the spectator; but the lines of the plans, distant from the ground line, must be all continued up to it; first, as the line, 11, is from the corner of the square, in order to find the point from which to draw the line 11, in the representation, to its vanishing point V; but, as the lines 7 and 8, 6 and 5, in the respective plans, are close to the ground line, nothing farther is required but to draw them to their respective points; it may be observed, that as 8 and *d*, in one square, and 6 and *c* in the other, are parallel to each other, they will all vanish in the point

U, while the sides 5, *e*, and 11, being at right angles to the above, will go to the point V, on the other side, which point can be found by a parallel ruler applied to these lines, and carried up to the point T, and a line ruled from thence to the horizontal line, which it will intersect at the point V, in the same manner as was used in finding the point U; and, in whatsoever direction a line may be in the plan, the same method will always discover its true vanishing point; and it must be observed, that, generally, the lines in representation, as in this Example, vanish in the contrary direction to the lines in the plans; but if the line 5, had been moved to W, on the left side of the ground line, the line in the plan and in the representation, and the one from T to V, would have been all three expressed in one long line.

Figure D *o* represents three roads. No, 1, is going up hill, and, therefore, vanishes above the horizontal line, and is seen over the head of the figure walking up. No. 2, is a level road, and, therefore, vanishes in the horizontal line; and the head of the figure, which is of the same height as the spectator, will be upon the horizontal line 4. No. 3, represents going down hill, vanishes below the horizon, and enables the spectator to see over the head of the figure, which, at a little distance from the ground line of the picture, appears very small, as nearly the whole distance from No. 1 to the line 6, may only represent a quarter of a mile; but the half of the space, from 3 to 7, may represent a mile. It must be observed,

that the appearance of going down hill, in nature, depends on many auxiliaries, such as the seeing only the upper part of figures, &c. the lower parts being hid by part of the road; and, at a small distance, seeing over the roofs of buildings, which never could be seen to a spectator walking on a level road, and by the road decreasing more suddenly in width in the picture; whereas, in viewing a very steep hill, the road would appear nearly equal in width at each end; the lines of the buildings must, in every case, vanish somewhere on the horizontal line, except those belonging to the sides, which being parallel to the top and bottom of the picture, never vanish; in this case, the side which is at right angles to this last, always goes to the vanishing point in the centre of the horizontal line, called the point of sight.

Figure O V represents the method of drawing a circle, where, agreeable to the method shown in the example M, a square is represented in the plan, and the same found in its perspective representation; a circle is then drawn in the plan, and intersected by diagonals and lines, which, when found in the representation, will be a guide, as, by the corresponding perspective intersections, the circle can be drawn with ease.

But, as a circle seen in perspective is always an oval, without attending to the rules of perspective, a learner may greatly improve himself by constantly drawing ovals of different curves. But as many per-

sons, and even those professing some knowledge of drawing, have disputed its being a perfect ellipsis, it is necessary to state, that their errour arises from forming in their minds, a line which equally and geometrically divides in half the oval, as in Figure V, instead of forming a perspective division, and then deciding, that the oval must be wrong, because, in nature, the nearer half would have appeared to be larger than the more distant half; whereas, had they but divided it perspectively, as in the examples above, they would have found as much difference between the two halves, as their eye required.

Ex. LM is the method to find the depth of reflections in water, if the object stand at the brink of a river; then mark off from the base downwards, a space equal to the height of the object, as at No. 1, and this will represent the right measure of the reflection downwards; and if, in still water, the object stand at a distance, as at No. 2, you must still draw downwards from the base the same measure as agrees with it in height, and mark only that part of the reflection which is seen in the water.

To draw the figure 3, which stands on a mount, measure the height of the top of the object, from the base of the mount, exactly under the monument; if you should view it from an eminence, and it should be near, for it must be remembered, that the form of the space a mount covers on the plain where it is raised, is generally a circle, and appearing in perspective,

would be seen as an oval, and then the perspective centre of the oval would be the point from which, to measure downwards, as much space as there is, from the top of the monument to this point: in such cases it will frequently be found that the ground will appear so wide, between the water and the monument, owing to its being viewed from a height, that very little or none of the reflection of the object can be seen in the water; but, to a person in a boat, the perspective appearance of the space of ground, would appear so narrow, that even if the object was at a distance, its base would appear nearly to touch the water's edge, by which means you would have almost the whole of the object reflected in the water. With respect to clouds and mountains, their apparent height should be set off downwards from the horizontal line, which the spectator must have determined previously; but, it must be observed, that though the knowledge of this method is very useful, yet, owing to the variety of lengths of reflections of the same object, owing to the frequent rippling of water, which renders the reflections very much longer than the objects, few artists ever make a formal application of the rules, as a clear reflection, like a looking-glass, would be generally injurious to the reality of the appearance of the object reflected; but when lengthened, and softened off by rippling, the objects in nature gain both by the difference in the decision and proportions of one to the other, and the eye is insensibly led from the faintest part of the rippling, up to the more solid termination of the real object.

P P represents a spectator looking through the plane of his picture; the point where the rays from his eyes meet, is the point of sight, and is intersected by the horizontal line; the top of the vertical line is the distance of the spectator's eye, from the picture transposed, and raised from the point of sight; the farther consideration of which is described in the explanation of the Drawing from plans.

G F, in the margin, represents an avenue; and it must be remembered, that it is in such views as these, wherein the path is straight before the spectator, that the point of sight is used, which is in the centre of the picture, and to which all lines, or rows of trees and buildings, going direct from the spectator, must vanish.

Figure F is here inserted for practice, and the learner will find it very useful to copy it often. It must be commenced in the same manner as Example A. Having determined the length of your building, and horizontal line and vanishing points, draw a horizontal line 9, from the top of the line 4, and through the farther and upper corner of the building 19, draw a line which intersects the line 9, at 11, from the point N, on the horizontal line, which point, as explained in the first Example, is fixed there for convenience of intersection, and might have been a little more to the right or left, without making any difference; then determine the situation of the line 10, for the corner of the projection, according to your judgment; then draw

a line through the corner 10 of the projection, to the line 9, which gives the point 12; then, from the nearest and highest corner of the building, measure the distance to that intersection, and set off the same measure from 11, which will give the point 13, then, from the point N, draw another line to 13; and where it intersects the line 2, at 16, is the opposite corner to that of the line 10; but, as this corner could not have been seen in this point of view, its use with the corner 10, is this, that by drawing two lines, 20 and 6, from the vanishing point 7, through these intersections, the top corner of the line 6, of the projection, may be determined, being drawn long enough to meet the top of the line 14, which line you must place according to your judgment; and, from the corner found by these two lines, 6 and 14, draw a line to the vanishing point 8; and where it meets with the line 15, drawn from the vanishing point 7, through the point 16, is the opposite corner of the projection, from which the line 15 must be drawn downwards; but, as the end of the building 19, corresponding in distance from the centre, with the line 4, is hid behind the projection, an additional measure is set off, on the line 9, at 18, so as to show, by an intersection made at 17, by a line drawn from 18 to N, on the horizontal line, the perspective appearance of that addition.

In Figure 5, the learner may see a very useful method of finding the true directions of lines without a vanishing point, or, when the point may be at too great a distance from the picture, for the length of your

ruler to reach. First, draw the skeleton of the building 1, 2, 3, 4, and 5, to your taste; then, from the farther corner, 6 and 7, draw two horizontal lines; then, from the point 11, transpose the length of the nearest line 3, slanting it till it meet the line 10; then transpose any measure of the line 3, (as the space from 8 to 12) on the line 13, from where it meets the line 10 to 14; then, from the point 14, draw a horizontal line to the line 4, and to where it intersects it draw the line 12, and that line will be in a true direction to the same vanishing point as the other lines would go to, were they all continued till they meet; but, to make them all meet in a point, on the horizontal line of your picture, you must first draw that line; and, from where it intersects the nearest line, 3, of the building, slant the measure from that intersection to the point 8, in a line, till it meet with the line 10; then continue this slanting line as much longer below the horizontal line, as the space is from where it intersects the line 3, to the bottom corner under it; and then, from the end of this slanting line, draw a horizontal line till it meets with the line 4; a line then drawn from the bottom of the building, from the lowest corner of the line 3, through the intersection on the line 4, will vanish on the horizontal line in the same point as the other lines.

The boats are inserted to show the different appearances which the same objects may make by being viewed from different positions. The tiles, at N O, are inserted as a help to those who draw the Example B on a larger scale.

The guiding rule G R, is formed of two short and thin sticks inclosed in the top of one longer, and fixed with a screw to tighten them, that, when held up by the spectator before a building, and adjusted to the angles which the buildings make to the spectator's eye, it will remain without shifting, till, by being laid flat on the paper, it will enable the draughtsman to rule the lines of two sides of the building in their true perspective direction, by which means, the vanishing point can be found almost as true as if the whole had been measured.

I K, and Figure T, represent the application of the knowledge of perspective to trees, to which the formal application of the rules would be impracticable. The principal thing to be attended to is, in making the foremost trees to project more sensibly from those behind, which as the principle is here expressed with rather a formal regularity for the sake of the pupil's memory, may be compared to the principle of what boys call a Turk's cap. This Example will be found of the greatest use in landscape, as nothing is more common than for learners in landscape to make the outline of the distant part of a wood on a hill, with the same large kind of execution as should be adopted for the front.

G H represents three spectators viewing buildings from different heights. Its use is to enforce the principle, that the spectator's eye, being raised or lowered, causes the horizontal line to vary in its height, upwards or downwards.

Figure U is inserted to show, that the centre between 1 and 2, found on the line 3, by a line from the point N, agrees with the centre found by the diagonal, as the vertical line drawn upwards from the intersection, meets at the same point on the upper line of the building.

Figure P represents the application of the principle of the rim of the cart-wheel, applied to the representation of a river, or road, going into a landscape, where at 1 and 2, the perspective does not affect the width, but only operates on the space from 2 to 3, in proportion as the spectator is high or low.

In the margin at top, at D, is another specimen of wrong perspective, where the top line of the gable, at 6, does not go to the same point as *n*, at the top of the door, which last should not go down so much, while the line 6 should slant a little more.

It now remains for the pupil to practise these examples separately, and on a larger scale, generally adhering to the order in which the lines are numbered, letting the lines by which the examples are worked, be marked only strong enough to be seen; and to make the rules familiar to them, it will be found very useful to practise them, both by memory and by the hand, when at leisure, as the principles may be recalled without the nicety of ruled lines. In this way, the Examples A and B, at the commencement, will be found of very great use; and likewise the arches, the nearer part of

which being generally difficult to turn, the pupil is advised to practise repeatedly; and, for this purpose, the curves in the windows of the tower of the church, will be most particularly useful; and as the application of the rules to different subjects is the method most likely to assist and confirm the pupils in their knowledge, both of perspective, and of the materials and subjects to which it may be applied.

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